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THE NEW INJURY SEVERITY SCORE AS PREDICTOR OF MORBIDITY AND MORTALITY IN ADULT TRAUMA PATIENTS

General Surgery

KEYWORDS: Trauma, New injury severity score (NISS).

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ABSTRACT

Trauma in India is a significant social and financial burden which requires prioritized attention. The death rate ought to be reduced with better organized systems of trauma care. The need for a scoring system to assess the severity of injuries in poly-trauma patients continues to be a challenge. An accurate scoring system is hence required to predict the morbidity and survival rate in a triage setting. The Injury Severity Score (ISS) does not take into scoring the multiple injuries in the same body region, whereas a New Injury Severity Score (NISS) may prove to provide a more accurate measure of trauma severity by considering the patient's three greatest injuries irrespective of the body region. This study proves that NISS score often increases the apparent injury severity and is a better tool for prediction of short-term mortality.

Introduction

The first attempt to quantify trauma and develop a scoring dates back to 1949 when the American College of Surgeons Committee on Trauma (ACSCOT) evolved from the Committee on the Treatment of Fractures that was established in 1922. In 1961 a trauma unit was opened in 1961 at the University of Maryland. The National Academy of Sciences and the National Research Council published in 1961 the important "white" paper entitled *Accidental Death and Disability: The Neglected Disease of Modern Society*[1]. Further studies into development of the triage criteria lead to the development of several trauma scoring systems. Major Trauma Patient is a person who has sustained potentially life or limb threatening injuries. The major trauma definition is used primarily to monitor field triage criteria as well as calculate under triage and over triage rates within a regional trauma system. The Injury Severity Score (ISS) is a measure of physical injury, based on adding up the square of the three highest individual anatomic injury scores (Abbreviated Injury Scale AIS) is calculated from all of the patient's known injuries[2] When used to define major trauma, an ISS of 15 or more has been the most frequently utilized threshold. Using this definition, a trauma victim must have a single anatomic injury score of 4, or two AIS 3 injuries in order to be categorized as sustaining "major trauma".ISS has been shown to have a good correlation with mortality over a wide range of ages[3]and different types of injuries[4], it has been the most frequently utilized method for stratifying the injuries of patients for comparison with prehospital triage scores[5].

A modification to the calculation of ISS scoring has been introduced as the New Injury Severity Score (NISS), which is defined as the sum of the squares of the AIS scores of each of a patient's three most severe AIS injuries regardless of the body region in which they occur. This method has been found to be more predictive of survival [6].In our institution, trauma is one of the most commonly dealt with in the emergency.

MATERIALS AND METHODS

It's a descriptive observational study. All trauma patients brought to the causality who fulfilled the preceding inclusion criteria were enrolled in the stud. Informed consent was obtained from the patients / family to be included in the study. All patients were clinically assessed and the data was collected as per a pre-designed proforma. Clinical assessment of the patient was done and the severity of the injuries was scored using the Abbreviated Injury Scale. This was based on the Condensed Abbreviated Injury Scale, published in 1988[7].The highest 3 AIS scores are used to calculate the New Injury severity score for a patient by adding up the squares of the highest 3 scores.

All the collected data was entered in the MS Excel 2007, then data was analysed with descriptive statistics (mean, standard deviation), percentages and data was expressed in diagrammatic form with the help of SPSS 16.0 version software. Independent t test, Chi square, Anova were used for the analysis of the data.

OBSERVATIONS AND RESULTS

Anova Test

	N	Mean	Std. Deviation	95% Confidence		p-value
				Lower Bound	Upper	
15-25	17	17.65	6.855	14.12	21.17	0. 738
25-35	30	17.00	6.395	14.61	19.39	
35-45	20	16.25	5.646	13.61	18.89	
45-55	21	15.24	6.115	12.45	18.02	
55 &	12	15.25	7.533	10.46	20.04	
Total	100	16.38	6.354	15.12	17.64	

Table 1 : Age & New Injury Severity Score

Most of the study population exposed to trauma were under the age group of 25-35 years, followed by 35-35 years and 45-55 years.

Surgical intervention	N	Mean	Std. Deviation	P-value
Y	60	17.67	6.576	.011
N	38	14.42	5.688	

Table 2 :New Injury Severity score vs surgical intervention

The correlation of the New Injury Severity score with the need for surgical intervention in the hospital was found to be significant with a p value of 0.011. The mean new injury severity score of 17 was found to predict more the need for surgical intervention and less than 14 score, was unlikely to require surgical intervention

	Mortality	Total No. of patients
New injury severity score	Yes	6
	No	94

Table 3: No. of patients – Mortality

The correlation of the New Injury Severity score with the chances of mortality was found to be significant with a p value of 0.045.The more the score, the patient had more chances of mortality. The mean new injury severity score of 22.67 was found to predict higher chances of mortality and less than 15.98 score, was unlikely. In predicting the duration of the hospital stay in trauma patients, a number of studies have been done to compare the new injury severity score(NISS) with the injury severity score(ISS).

Balogh ZJ et al [8] in 2003 compared both and concluded that recognition of high-risk group was better with the NISS score and not possible using the traditional ISS alone from retrospective or prospective databases. It is suggested that the NISS should replace the traditional ISS in trauma outcome research.

A study conducted by Hideo Tohira et al [9], showed that the NISS

score appeared to be better at predicting the mortality of blunt trauma patients than the ISS, although it could not determine the relative performance of the ICISS against the TRISS. The ICISS was less stable in its predictive performance than the AIS-based tools because of the many variations in its analysis and computational methods A research undertaken to illustrate the statistical properties of the injury severity score (ISS)and the new injury severity score (NISS) was done based on Three data sources—the National Paediatric Trauma Registry, the Massachusetts Uniform Hospital Discharge Data Set and a trauma registry from a level I trauma centre in Massachusetts. This study suggested that the ISS/NISS was found to have a positively skewed distribution and transformation did not improve their skewness.

These findings suggested that for statistical and analytical purposes of the ISS and NISS should not be considered a continuous variable, especially if ISS and NISS is treated as a continuous variable for correlation with an outcome measure.

A Bibliographical review was done by Lilia de Souza Nogueiraet al on research approaching NISS in the last ten years and gave some important conclusions. NISS, which was published in 1997, has been continuously tested comparing with ISS and other indexes. Research comparing ISS with NISS regarding variables that characterize the consequences of trauma, are favourable to the new version of the instrument, especially when they presented conclusions that showed the superiority of NISS and do not observe ISS outstripping NISS in its performance.

These evidences and the greater easiness to calculate NISS compared to ISS has led to the replacement of ISS by NISS, however, 10 years after the proposal of change in the calculation of ISS, the scientific community is reticent, usually using ISS in their research and testing the new version of the instrument.

Palmer CS et al, studied data from 37,760 patients in a state trauma registry. AIS data coded using the 1998 AIS (AIS98) were mapped to AIS08. ISS and NISS were calculated, and their effects on patient classification compared. The ability of ISS and NISS to predict mortality or and the need for ICU or urgent surgery was compared. This study concluded that while Injuries are coded using AIS08, an NISS >12 appears to function similarly to an NISS >15 in AIS98 for the purposes of identifying a population with an elevated risk of death after injury. Where mortality is a primary outcome of trauma monitoring, an NISS >12 threshold could be adopted to identify major trauma patients. In this study, the results were similar but the cut off value of NISS was found to be higher than 12 to predict mortality. Smith BP et al compared NISS and ISS and concluded that NISS outperformed ISS as a predictor of both mortality and complications in civilian penetrating trauma patients.

Although there have been many studies which have proposed the NISS should replace ISS, Zhao XG et al , suggested that from a retrospective review of registry data from 2,286 multiple trauma patients, NISS should not replace ISS because they shared similar accuracy and calibration in predicting multiple blunt trauma patients. NISS may be more sensitive but less specific than ISS in predicting mortality in certain penetrating injury patients.

In this study, in a population of 100 patients, NISS scoring was found to predict the longer duration of hospital stay, emergency surgical intervention and the mortality risk, which is similar to multiple other studies.

CONCLUSION : The New injury severity score, a modified version of the widely used and tested Injury severity score has been found to predict effectively certain outcomes in trauma patients in this study. The clinical outcomes such duration of hospital stay, need for emergent surgical intervention and mortality have been predicted effectively with the New Injury severity score. Hence, this scoring system can be used as an effective tool and a prognostic indicator in the management of trauma patients.

References

[1]. Accidental Death and Disability: The Neglected Disease of Modern Society. National Academy of Sciences (US) and National Research Council (US) Committee on Trauma; National Academy of Sciences (US) and National Research Council (US): Washington (DC): National Academies Press (US); 1966.
[2]. BAKER S, O NEILL B. THE INJURY SEVERITY SCORE. The Journal of Trauma: Injury, Infection, and Critical Care. 1976;16(11):882-885.
[3]. Tay S, Sloan E, Zun L, Zaret P. Comparison of the New Injury Severity Score and the Injury Severity Score. The Journal of Trauma: Injury, Infection, and Critical Care. 2004;56(1):162-164.
[4]. Hedges J, Feero S, Moore B, Shultz B, Haver D. Factors contributing to paramedic onscene time during evaluation and management of blunt trauma. The American Journal of Emergency Medicine. 1988;6(5):443-448.
[5]. Plant J, MacLeod D, Kortbeek J. Limitations of the Prehospital Index in Identifying Patients in Need of a Major Trauma Center. Annals of Emergency Medicine. 1995;26(2):133-137.
[6]. Burstein J, Henry M, Alicandro J, McFadden K, Jr. H, Hollander J. Evidence for and Impact of Selective Reporting of Trauma Triage Mechanism Criteria. Academic Emergency Medicine. 1996;3(11):1011-1015.
[7]. Civil ID, Schwab CW. The Abbreviated Injury Scale, 1985 revision: A condensed chart for clinical use. J Trauma. 1988 Jan;28(1):87–90.
[8]. Balogh ZJ1, Varga E, Tomka J, Süveges G, Tóth L, Simonka JA. The new injury severity score is a better predictor of extended hospitalization and intensive care unit admission than the injury severity score in patients with multiple orthopaedic injuries. J Orthop Trauma. 2003 Aug; 17(7):508-12.
[9]. Hideo Tohira, 1 Ian Jacobs,1 David Mountain,1 Nick Gibson,1 and Allen Yeo2. Systematic review of predictive performance of injury severity scoring tools: Scand J Trauma Resusc Emerg Med. 2012; 20: 63.